

Site Investigation

November 1997

**Quality Motors
U.S. Route 5
St. Johnsbury, Vermont**

Prepared For:

**Barakos-Landino Design Group
2911 Dixwell Avenue
Hamden, Connecticut 06518-3130**

THE JOHNSON COMPANY, INC.
Environmental Sciences and Engineering

100 State Street, Suite 600
Montpelier, Vermont 05602
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THE JOHNSON COMPANY, INC.

Environmental Sciences and Engineering

November 18, 1997

Mr. Pat Gorman
Barakos-Landino Design Group
2911 Dixwell Avenue
Hamden, Connecticut 06518-3130

Re: Site Investigation Report for Quality Motors Property - Lots #1 and #2; St. Johnsbury, Vermont.
JCO No. 3-0212-3.

Dear Mr. Gorman:

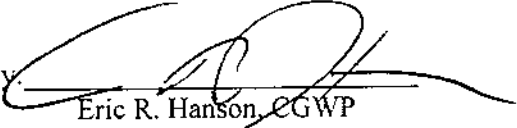
The Johnson Company is pleased to present our site investigation report for the referenced property. The results of this investigation indicate that there is an area of contaminated groundwater on Lot #2 where concentrations of petroleum-related hydrocarbon compounds exceed the Vermont groundwater standards. These standards are not exceeded in the two groundwater samples collected on Lot #1. Additionally, soil screening performed during our April 24, 1997 soil structural boring survey on Lot #1 indicated no elevated concentrations of petroleum-related hydrocarbon vapors. Therefore, we are recommending additional monitoring of the groundwater on Lot #2, and no further investigation on Lot #1.

Please review the site investigation report, and call with any questions.

Respectfully Submitted,

THE JOHNSON COMPANY, INC.

By:


Eric R. Hanson, CGWP
Project Scientist

cc. Bob Butler, Vermont Waste Management Division

Reviewed By: baw
I:\PROJECTS\3-0212-3\SI.RPT November 11, 1997 erh

TABLE OF CONTENTS

EXECUTIVE SUMMARY	ii
1.0 INTRODUCTION	1
2.0 SITE INVESTIGATION	1
2.1 TEMPORARY MONITORING WELL INSTALLATION AND SOIL SCREENING ..	1
2.1.1 <u>Temporary Monitoring Well Installation</u>	1
2.1.2 <u>Soil Screening</u>	4
2.1.3 <u>Groundwater Sampling</u>	5
3.0 DISCUSSION	7
4.0 CONCLUSIONS AND RECOMMENDATIONS	7
LIST OF TABLES	
Table 1 Temporary Monitoring Well Installation Details	5
Table 2 Summary of Laboratory Analytical Data for 11/10/97 Groundwater Samples	6
LIST OF FIGURES	
Figure 1 Site Location Map	2
Figure 2 Site Sketch Map - Groundwater Contours	3
LIST OF APPENDICES	
Appendix A Laboratory Analytical Results	

EXECUTIVE SUMMARY

The Johnson Company performed a site investigation for Lots #1 and #2 at the Quality Motors property (the Site) in St. Johnsbury, Vermont on November 10, 1997 for Barakos-Landino Design Group of Hamden, Connecticut. The site investigation was performed to determine the degree and extent of petroleum-contaminated soil and groundwater on the Site associated with release(s) from former underground storage tanks (USTs) on Lot #2 of the Site.

The site investigation included the installation of eight temporary groundwater monitoring wells by Adams Engineering, Inc. of Underhill, Vermont; screening of soils for the presence of volatile organic compound (VOC) vapors using a photoionization detector (PID); and groundwater sampling for laboratory analysis for the presence of petroleum-related VOCs. The monitoring wells were installed at six locations hydraulically downgradient of the former USTs on Lot #2 of the Site and at two locations on Lot #1 of the Site. All coreholes in which the monitoring wells were installed were completed approximately three feet below the water table in the fine sandy, silty sand overburden on the Site.

Elevated VOC vapor concentrations (as measured with the PID) and petroleum odors were noted at the coring locations closest to the former USTs (JCO-1 through JCO-3). The battery in the PID failed during the coring at JCO-3; therefore, temporary monitoring wells JCO-4 through JCO-8 were installed without the collection of soil samples for VOC screening. No petroleum odors were noted at these coring locations. At all of the locations, stainless steel temporary monitoring wells were installed by inserting the well into the corehole, using the vibratory coring rig to advance the well to the desired depth. Each temporary monitoring well was developed by low-discharge pumping with a peristaltic pump. We performed a level survey of the wells and measured the depths to groundwater prior to the collection of groundwater samples to develop a groundwater contour map. The groundwater beneath the Site is flowing westward, towards the Passumpsic River, at a low hydraulic gradient.

The Johnson Company collected groundwater samples on November 10, 1997 at the Site from the eight temporary groundwater monitoring wells. A duplicate sample was also collected from temporary monitoring well JCO-1 for quality assurance purposes. These samples were analyzed for petroleum-related VOCs and for total petroleum hydrocarbons (TPH) using Environmental Protection Agency (EPA) Methods 8020 and modified 8015 respectively, by Eastern Analytical, Inc. of Concord, New Hampshire.

The analytical results indicate low concentrations of petroleum-related VOCs in monitoring wells JCO-1, JCO-2, JCO-3 and JCO-5. Elevated TPH concentrations were noted in all temporary monitoring wells except JCO-4, JCO-7, and JCO-8. With the exception of benzene concentrations in the groundwater samples collected from temporary monitoring wells JCO-2, JCO-3, and possibly JCO-1 (where the detection limit was 10 parts per billion), all concentrations of the noted VOCs are below Vermont Groundwater Enforcement Standards.

Soil and groundwater information collected during this site investigation, and soil boring and screening data collected during The Johnson Company's April 1997 structural boring activities, indicate that petroleum-contaminated soils and groundwater exist in the vicinity and hydraulically downgradient of the former USTs on the Site (Lot #2). No soil or groundwater contamination has been observed on Lot #1. All known sources of petroleum contamination have been removed from the Site. We recommend the installation of three to four permanent groundwater monitoring wells on Lot #2 to enable periodic groundwater sampling. Because the current Quality Motors building is slated for demolition with subsequent regrading of the Site, we recommend that the monitoring wells be installed after this site work is performed.

1.0 INTRODUCTION

The Johnson Company has completed a site investigation at the Quality Motors property (the Site) located on U.S. Route 5 in St. Johnsbury, Vermont (Figure 1). This investigation was performed at the request of Barakos-Landino Design Group of Hamden, Connecticut. The purpose of this site investigation was to determine the degree and extent of petroleum-related soil and groundwater contamination on the Site attributable to former underground storage tanks (USTs), including the 1,500-gallon fuel-oil UST that was closed on September 25, 1997. According to information gathered during our Phase I Environmental Site Assessment (ESA) of the Site performed for Barakos-Landino in April 1997, three 4,000 gallon diesel fuel USTs were removed in 1987 from the area immediately to the west of the recently closed fuel-oil UST.

2.0 SITE INVESTIGATION

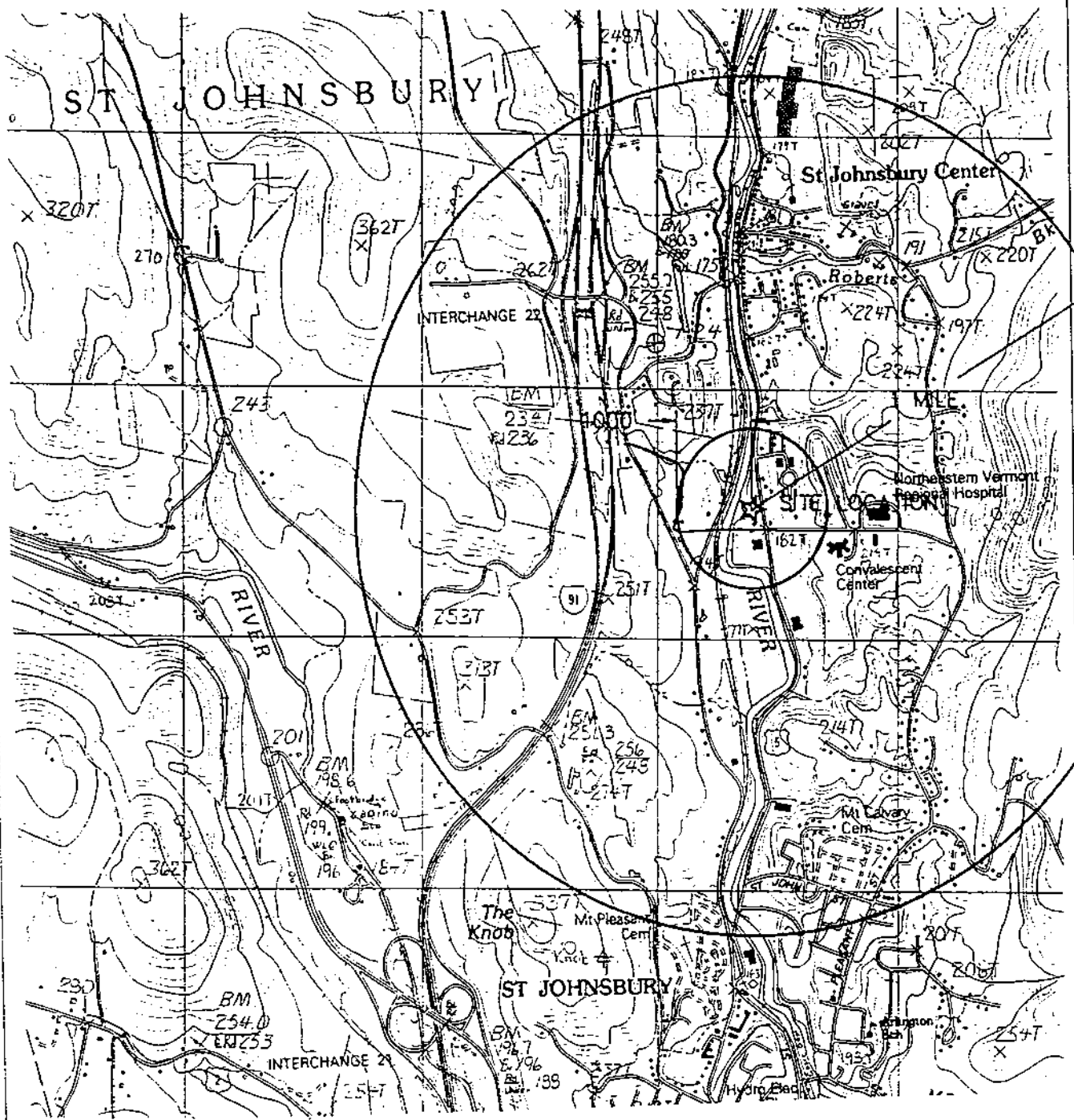
The Johnson Company completed this site investigation on November 10, 1997. Components of the site investigation included the installation of eight small-diameter temporary groundwater monitoring wells, screening of soils for VOC vapors, and groundwater sampling and analysis.

2.1 TEMPORARY MONITORING WELL INSTALLATION AND SOIL SCREENING

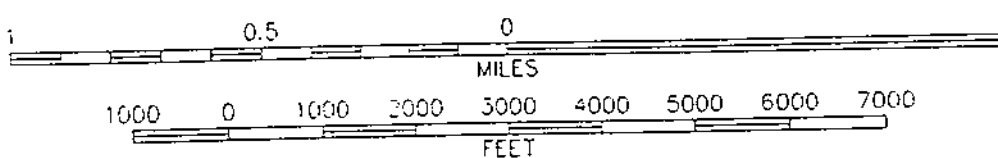
2.1.1 Temporary Monitoring Well Installation

Adams Engineering, Inc. of Underhill, Vermont used their pickup truck-mounted vibratory coring rig to install eight, one-inch diameter temporary monitoring wells on the Site at the locations indicated on Figure 2 (monitoring wells JCO-1 through JCO-8). The temporary monitoring wells were constructed of stainless steel 0.006-inch factory-slotted screens (five-foot screen interval) and solid riser pipe. The temporary monitoring wells were placed in the selected locations to enable the collection of soil and groundwater samples near the location of the former USTs, hydraulically downgradient of the former fuel oil UST, and on Lot #1.

The coreholes for temporary monitoring wells JCO-1 through JCO-3 were installed using a vibratory driven core barrel with a cylindrical clear plastic lining for soil core retrieval. At these three coring locations, soil samples were collected for stratigraphic analysis and screening for volatile organic compound (VOC) vapors with a photoionization detector (PID). The PID's battery failed during the screening of soil samples from the location of JCO-3. The coreholes for temporary monitoring wells for



NORTH



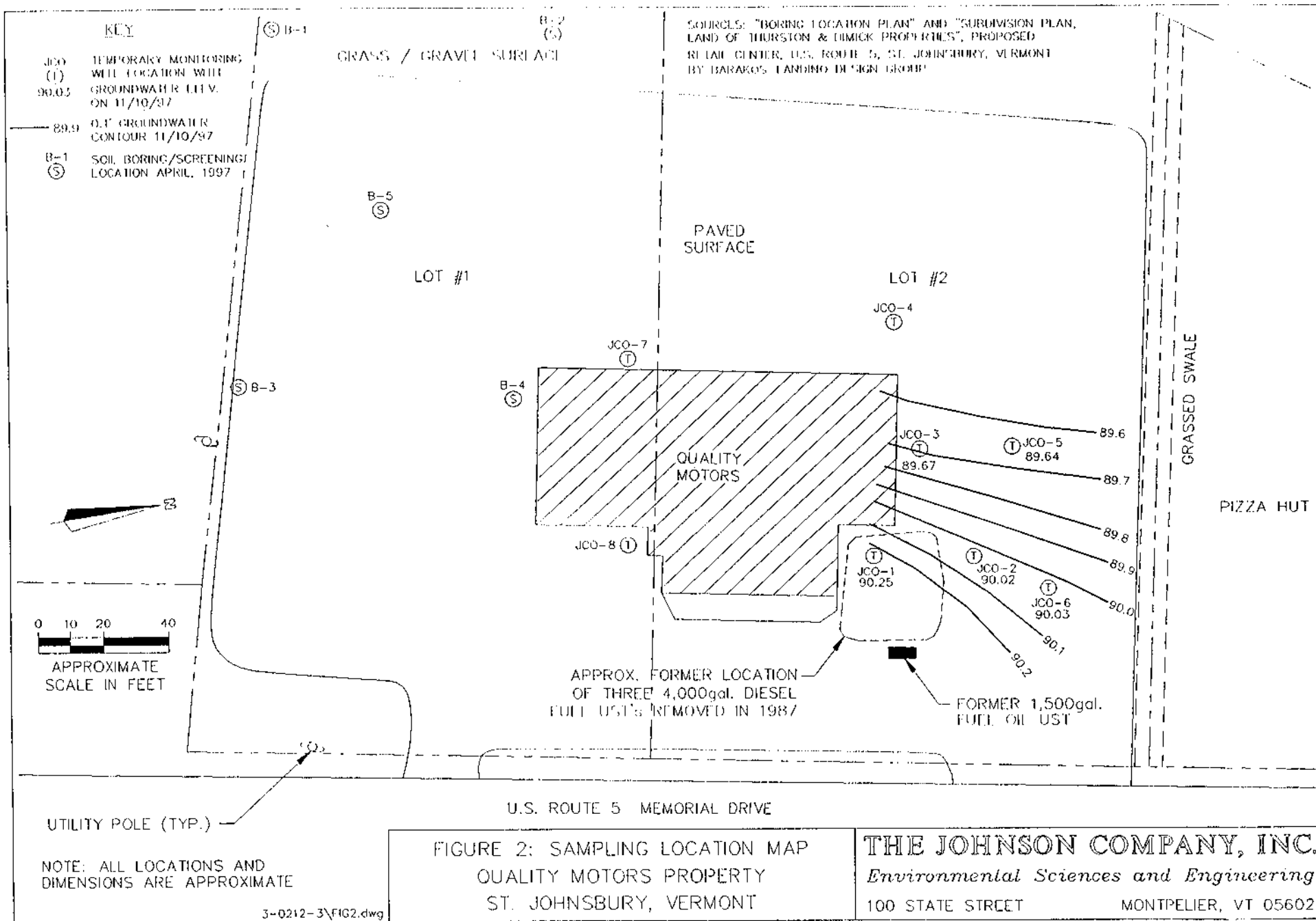
CONTOUR INTERVAL 6 METERS

MAP
LOCATION

BASE MAP: USGS 7.5 Minute Topographic Quadrangle ST. JOHNSBURY, VERMONT PROVISIONAL EDITION 1983

FIGURE 1: SITE LOCATION MAP
QUALITY MOTORS PROPERTY
ST. JOHNSBURY, VERMONT

THE JOHNSON COMPANY, INC.
Environmental Sciences and Engineering
100 STATE STREET MONTPELIER, VT 05602



temporary monitoring wells JCO-4 through JCO-8 were installed using a solid steel rod driven with the vibratory coring rig. No soil samples were collected at these locations. At all of the locations, the temporary monitoring wells were installed by inserting the well into the corehole, using the vibratory coring rig to advance the well to the desired depth.

After the completion of the monitoring well installation, we performed a level survey of the top-of-casing for temporary monitoring wells JCO-1 through JCO-6 to determine their relative elevations. Temporary monitoring wells JCO-7 and JCO-8 were not surveyed due to time and darkness constraints. An arbitrary datum elevation of 100 feet at the storm grate near the northeastern corner of the property was chosen. With this and depth to groundwater information, we developed a groundwater contour map for November 10, 1997.

2.1.2 Soil Screening

During the installation of temporary monitoring wells JCO-1 through JCO-3, soil samples collected from the coreholes were screened via a heated headspace method for the presence of VOC vapors using a PID. The PID, a Thermo Environmental Model 580B OVM, was calibrated on-site to 100 parts per million (ppm) isobutylene gas. For the heated headspace method, soil samples were placed in 40-milliliter (ml) vials to fill the vials approximately halfway. The teflon septa were replaced with a layer of aluminum foil and the screw caps were placed back on the vials to hold the foil tightly in place. The samples were then heated for a minimum of five minutes at 140°F, after which time the tip of the PID was used to pierce the foil and collect the VOC vapor concentration readings. The maximum reading from each vial was recorded. The results of the headspace analyses, and other pertinent temporary monitoring well installation information, are summarized in Table 1.

As can be noted, the most elevated PID headspace readings were observed in the gray silty sand located at approximately six to ten feet below ground surface and continued to the bottom of the soil profile (i.e., below the water table on November 10, 1997).

Table 1: Temporary Monitoring Well Installation Details				
Well ID	Top of Casing Elevation (ft)	Depth to Groundwater (ft)	Stratigraphic Description	PID Reading (ppm)
JCO-1	102.01	11.76	0-6.4': fill over brown, humid, friable-loose fine sand. 6.4-14.8': gray, wet-saturated, friable silty sand.	59.8 at 5.6' 718 at 7.1' 685 at 12.3' 168 at 14.8'
JCO-2	101.77	11.75	0-3': fill over gray, humid, v. fine silty sand. 4.8-9.8': no recovery. 9.8-14.8': gray, humid-saturated, friable fine silty sand.	146 at 2.1' 689 at 10.3' 540 at 11.8'
JCO-3	102.20	12.53	0-7.6': fill over brown, humid, friable-loose fine sand. 7.6-9.8': gray, humid-damp, friable silty sand. 9.8-14.8': gray, damp-saturated, friable silty sand	8.5 at 6.2' Petrol. odor in silty sand*
JCO-4	102.53	12.98	Well completed to 14.8'	---
JCO-5	103.89	14.25	Well completed to 14.8'	---
JCO-6	102.11	12.08	Well completed to 14.8'	---
JCO-7	---	---	Well completed to 14.8'	---
JCO-8	---	---	Well completed to 14.8'	---
* = PID malfunction				

2.1.3 Groundwater Sampling

After the installation of each of the temporary monitoring wells, each of the wells was developed for a minimum of 15 minutes by low-discharge pumping of the well using a peristaltic pump. The well development was successful in removing the fine silt and sand particles that had entered the well screen during installation; the discharge water cleared up considerably during the development of each of the temporary monitoring wells.

Prior to sampling, the static water level in each of the temporary monitoring wells was measured using an electronic water level indicator. Using the level survey data, we developed a groundwater contour map for the Site on November 10, 1997 that is shown on Figure 2. As can be noted, the groundwater flow direction in the vicinity of the former UST is generally westward toward the southward-flowing Passumpsic River located to the west of the Site.

With the exception of temporary monitoring well JCO-5, all groundwater samples were collected using a small-diameter disposable (i.e., single use) bailer. Because the well development occurred prior to the sampling, no additional groundwater was evacuated from the temporary monitoring wells prior to sampling. A duplicate sample was collected from temporary monitoring well JCO-1 and a trip blank was submitted for laboratory analysis for quality assurance/quality control purposes. Temporary monitoring well JCO-5 was sampled using polyethylene tubing with a check valve installed in the bottom. Groundwater was collected in the tubing, and then transferred to the appropriate volatile organic analyte (VOA) vial. All samples were collected in 40 milliliter VOA vials preserved with hydrochloric acid.

After the groundwater samples were collected, they were immediately chilled in a cooler until their delivery to Eastern Analytical, Inc. of Concord, New Hampshire for analysis for petroleum-related hydrocarbons using Environmental Protection Agency (EPA) Method 8020 and for total petroleum hydrocarbons (TPH) using EPA Method 8015. A summary of the laboratory analysis is presented in Table 2. The complete laboratory report is included in Appendix A.

Table 2: Summary of Laboratory Analytical Data for 11/10/97 Groundwater Samples									
Analyte	JCO-1 ($\mu\text{g/L}$)	JCO-2 ($\mu\text{g/L}$)	JCO-3 ($\mu\text{g/L}$)	JCO-4 ($\mu\text{g/L}$)	JCO-5 ($\mu\text{g/L}$)	JCO-6 ($\mu\text{g/L}$)	JCO-7 ($\mu\text{g/L}$)	JCO-8 ($\mu\text{g/L}$)	Groundwater Enforcement Standard ($\mu\text{g/L}$)
Benzene	<10	60	10	<1	2	<1	<1	<1	5
Toluene	<10	<10	<10	<1	<1	<1	<1	<1	2420
Ethylbenzene	20	110	110	<1	2	<1	<1	<1	680
Xylenes	70	290	270	<1	<1	<1	<1	<1	400
TPH (C ₆ -C ₉)	200	600	600	<20	20	<20	<20	<20	---
TPH (C ₁₀ -C ₁₂)	2,000	6,000	10,000	<20	200	100	<20	<20	---
$\mu\text{g/L}$ = micrograms per liter									

3.0 DISCUSSION

Soil and groundwater information collected during this site investigation, and soil boring and screening data collected during The Johnson Company's April 1997 Phase I ESA, indicate that petroleum-contaminated soils and groundwater exist in the vicinity and hydraulically downgradient of the former USTs on the Site (Lot #2). Concentrations of petroleum-related hydrocarbons in the groundwater in a portion of the area investigated exceed Vermont Groundwater Enforcement Standards for benzene at two of the sampling locations (JCO-2 and JCO-3). No soil or groundwater contamination has been observed on Lot #1. The overburden is comprised primarily of fine sand over silty sand. All known sources of petroleum contamination have been removed from the Site. Based on VOC vapor measurements conducted on November 10, 1997, the nearby Quality Motors building basement (poured concrete walls and floor) has not been affected by the noted soil vapor contamination. Also, based on our visual observations and groundwater quality data, the Passumpsic River to the west of the Site has not been affected by the noted groundwater contamination.

4.0 CONCLUSIONS AND RECOMMENDATIONS

The results of this site investigation, combined with the results of our previously performed UST closure assessment, and Phase I ESA and soil structural borings indicate that there is a plume of groundwater contamination that exists on Lot #2 of the Site. No petroleum-related contamination exists in the soil or groundwater on Lot #1 of the Site.

Because there are no sensitive receptors currently being affected by the contamination noted near the former UST area on Lot #2 of the Site, and all known sources of petroleum-related contamination have been removed from the Site, we recommend the installation of three to four permanent groundwater monitoring wells on Lot #2 to enable periodic groundwater sampling. Our recommended locations for these monitoring wells coincide with the locations of temporary monitoring wells JCO-1, JCO-2, JCO-3 and JCO-5. We recommend that these monitoring wells be monitored quarterly so that seasonal and annual trends of groundwater contamination can be established. Because the current Quality Motors building is slated for demolition with subsequent regrading of the Site, we recommend that the monitoring wells be installed after this site work is performed.

Appendix A
Laboratory Analytical Report

Fax Cover Sheet

3-0212-3
ERH

eastern analytical
(603) 228-0525

professional laboratory services

Preliminary analytical results
Subject to final review by QA/QC officer

EAI ID#: 10652 TJC

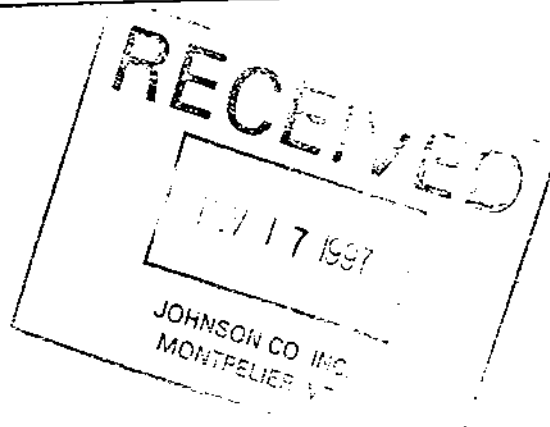
Client ID: Quality Motors 3-0212-3 VT

Date Received: 11/12/97

To: Eric Hanson

Company: The Johnson Company

FAX: 802-229-5876 (58)



	Volatile Organics	Extractable Organics	Metals	Inorganics	Other
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Date Faxed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Upcoming Events:

Green Mountain Water Environment Association Conference
November 6, 1997 Burlington, VT call 802-583-2385 for more information.

New Hampshire Municipal Conference
November 19-21 The Center of NH, call 224-7447 for more information.

LABORATORY REPORT



Eastern Analytical, Inc. ID#: 10652

Client: The Johnson Company

Client Designation: Quality Motors 3-C212-3 VT

Volatile Organic Compounds

	JCO-1	JCO-2	JCO-3	JCO-4	JCO-5	JCO-6
Sample ID:	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Matrix:	11/12/97	11/12/97	11/12/97	11/12/97	11/12/97	11/12/97
Date Received:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Units:	11/13/97	11/13/97	11/15/97	11/13/97	11/13/97	11/13/97
Date of Analysis:	TML	TML	TML	TML	TML	TML
Analyst:	* 8020 mod	* 8020 mod	* 8020 mod	* 8020 mod	* 8020 mod	* 8020 mod
Method:	10	10	10	1	1	1
Dilution Factor:	< 100	< 100	< 100	< 10	< 10	< 10
MTBE	< 10	60	10	< 1	2	< 1
Benzene	< 10	< 10	< 10	< 1	< 1	< 1
Toluene	< 10	110	110	< 1	2	< 1
Ethylbenzene	20	260	240	< 1	< 1	< 1
m,p-Xylene	20	30	10	< 1	< 1	< 1
o-Xylene	* mod: MTBE included in compound calibrations.					
Method:	8015 mod	8015 mod	8015 mod	8015 mod	8015 mod	8015 mod
GRO by Carbon Range	200	600	600	< 20	20	< 20
C ₅ -C ₉	2,000	6,000	10,000	< 20	200	100
C ₁₀ -C ₁₂						

LABORATORY REPORT



Eastern Analytical, Inc. ID#: 10652

Client: The Johnson Company

Client Designation: Quality Motors 3-0212-3 VT

Volatile Organic Compounds

Sample ID:	JCO-7	JCO-8	JCO-DUP	Trip Blank
Matrix:	Aqueous	Aqueous	Aqueous	Aqueous
Date Received:	11/12/97	11/12/97	11/12/97	11/12/97
Units:	ug/L	ug/L	ug/L	ug/L
Date of Analysis	11/13/97	11/13/97	11/15/97	11/13/97
Analyst:	TML	TML	TML	TML
Method:	* 8020 mod	* 8020 mod	* 8020 mod	* 8020 mod
Dilution Factor:	1	1	10	1
MTBE	< 10	< 10	< 100	< 10
Benzene	< 1	< 1	< 10	< 1
Toluene	< 1	< 1	< 10	< 1
Ethylbenzene	< 1	< 1	20	< 1
m,p-Xylene	< 1	< 1	30	< 1
o-Xylene	< 1	< 1	40	< 1
* mod: MTBE included in compound calculations.				
Method:	8015 mod	8015 mod	8015 mod	8015 mod
GRO by Carbon Range				
C ₅ -C ₉	< 20	< 20	1,000	< 20
C ₁₀ -C ₁₂	< 20	< 20	30,000	< 20

Approve I By: Clifford Chase, Volatile Organics Supervisor